Fettered Cross-Border Capital Flows, External Finance Dependence, and International Trade

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Abstract

The effects of capital controls on international trade have not been thoroughly examined empirically. Using highly disaggregated bilateral industry-level export data across a large number of countries, this paper evaluates how restrictions on cross-border capital flows affect export. We identify the effect of capital control on export by exploiting the variation in capital control across countries and variation in external finance dependence across industries. While we find that capital control adversely effects total exports, analyses of the export margins indicate that the export distorting effect of capital controls works by deterring single and multiple export market entries by exporters, reducing export intensities of exporters, and the range of goods exporters can ship to each market destination. Our result has important policy implications for countries that seek to pursue export-led growth but suffer from capital accounts restrictions.

Keywords: Capital controls, International Trade, External Finance Dependence
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1. Introduction

In this paper, we analyze the international trade effects of fettered international capital flows and the mechanisms through which this works. The potential economic effects of restrictions on cross-border capital flows have been an issue of a long, unending debate among economists and policymakers. While the debate was lost between the late 1990s and early 2000s, the global financial crisis in 2008/2009 has invigorated it. However, this time, the debate had favored capital control as a seeming feat was attained by its exponents when in November of 2012, the International Monetary Fund (IMF) endorsed a limited use of capital control (IMF, 2012).

This new stance of IMF, which differs from its age-long neoliberal stance, has intensified research examining the potential costs, benefits, and effectiveness of capital control. However, extant studies have focused mainly on economic growth (Edison *et al.,* 2004; Henry, 2007), while few studies focus on different growth components such as domestic investment (Mody & Murshid, 2005), financial development (Klein & Olivei, 2008), exchange rate (Edwards & Rigobon, 2009), and productivity (Bonfiglioli, 2008), among others. Less studied in this literature is the relationship between capital control and international trade, although capital control can affect international trade in several ways such as impacting the domestic price of imports, transaction costs, exchange rates, financial market, and portfolio investment (Tamirisa, 1999).

To our knowledge, studies that have examined the trade effects of capital control are Tamirisa (1999), Wei & Zhang (2007), and Fu & Cao (2020). Tamirisa (1999) utilized a cross-sectional sample of 40 countries and found that exchange and capital controls reduce trade. However, a further analysis comprising different samples of developed and developing countries in the study, showed that the effect was only evident in non-industrialized countries. Wei & Zhang (2007)

examined whether exchange control works as a form of non-tariff barriers to trade. They found that a one standard deviation increase in the controls on trade payment has the same negative effect on trade as an increase in tariff by about 14 percentage point, while a one standard deviation increase in the controls on foreign exchange transactions reduces trade by the same amount as a rise in tariff by 11 percentage point. Finally, Fu & Cao (2020) examined the trade effects of inward and outward capital controls. They found that inward capital controls hurt exports, while outward capital controls promote exports.

While the previous studies have helped us gain insights into the relationship between capital control and international trade, the question about *how* capital controls affect international trade has not been addressed. Arguing along this line, Tamirisa (1999) noted that the effect of capital control on trade would depend, among others, on their interaction with other distortions in the economy. However, their study did not attempt to identify or analyze how these distortions influence the trade effects of capital control. Hence, we contribute to the literature by examining *how* capital control can affect international trade by increasing the cost of external capital. We also contribute to the literature by examining how capital controls affect the different trade margins to provide further context on the exact mechanism linking capital controls and trade.

Our argument of a potential trade effect of capital control via the *"cost of external capital channel"* is based on the well-established literature suggesting the importance of a firm's access to credit for international trade (Amiti & Weinstein, 2011; Manova, 2013). Compared to domestic production, international trade is associated with additional upfront fixed costs and huge variable costs, which make firms participating in international trade to depend more on external finance (Manova, 2013). To meet these enormous finance needs, firms access both domestic and foreign markets. However,

because capital control limits the credit supply options for firms, this will reduce the amount of available capital and increase the cost of capital, as domestic interest rates become sticky relative to the world's competitive market price. Hence, firms are either forced to lower investments and trim production or shut down entirely. Either of these would have a dampening effect on trade. Importantly, the limited available capital and the high cost of external capital would constrain firms in meeting up the enormous fixed and variable costs associated with international trade, and thereby exert a negative effect on both the extensive and intensive export margins.

To evaluate our idea that capital control affects trade through raising the cost of external capital, we examine the differential impact of capital control on the export activities across industries with inherently different reliance on external finance (following the methodology in Rajan & Zingales, 1998). As stressed by Braun & Larrain (2005), the response of firms to credit market frictions depends on their relative reliance on the financial market. Hence, as capital control curtails the amount of available capital and raises the cost of external capital in the financial market, it should have a disproportionately contractionary impact on sectors that are more dependent on external finance. Consequently, we answer our research question by evaluating whether countries with fettered international capital flows have, on average, relatively worse export performance in industries with greater reliance on external finance. We test this hypothesis using a bilateral export data of 99 countries in 27 industries over the period spanning 1995-2015. We utilized the Fernández *et al.* (2016) capital control indicator as an empirical measure of the extent of restrictions on cross-border capital flows in a country. External finance dependence is measured using the industry external finance dependence initially computed by Rajan & Zingales (1998). The index measures for each industry, the share of capital expenditures not financed with cash flows from operations.

Because firms depend on external finance to fund their activities, including trade, they are more susceptible to credit friction in the financial market.

To summarize our results, we find that fettered international capital flows, by increasing the cost of external capital, distorts a country's export performance. This result holds after controlling for a battery of fixed effects at the country and industry levels, and after employing alternative estimation strategies including the Helpman *et al.* (2008) two-stage estimation procedure and Santos & Tenreyro (2006) Pseudo Poisson Maximum Likelihood to address zero trade observations. The result also remains robust after controlling for conventional sources of comparative advantage and the quality of the domestic credit market. It is also robust to using alternative measures of capital control. When we differentiate between inward and outward capital controls, we find that both types of restrictions distort exports, albeit the relative impact of inward capital control is much higher. Decomposing exports into the extensive and intensive margins to further underpin how capital control affects exports, we find that capital control adversely affects the export performances of a country, by deterring single and multiple export market entries and reducing the range of goods exported (i.e., extensive margin); and by reducing export intensities (i.e., intensive margin), particularly in industries that rely more on external finance. Finally, we find that the export distorting effects of capital control is higher in non-OECD countries relative to OECD countries.

The remainder of this paper is structured as follows. Section 2 presents a theoretical background that informs the empirical analysis. Section 3 discusses the research methodology, specifying the empirical model and different data sources used in the analysis. Section 4 presents the empirical results, while Section 5 concludes.

2. Theoretical Background

The conventional view about capital account liberalization is that unfettered international capital flows can foster a more efficient allocation of resources, provide opportunities for risk diversification and credit access at the most favorable rates, promote intertemporal trade and help promote financial development and ultimately, lead to a permanent increase in the standard of living (Edison *et al.,* 2004; Henry, 2007). Hence, imposing restrictions on capital mobility means foregoing these benefits, owing to the distortions and resource misallocation that capital control gives rise to (Ostry *et al.,* 2010). It is further argued that the gains of unfettered international capital flows would be higher in developing countries because they are relatively capital scarce and labor abundant, so access to foreign capital should help them increase investment and grow faster (Kose *et al.,* 2011). However, the wisdom in this view has been questioned by many scholars.

While some scholars agree that capital account liberalization may be desirable, they argue that its gains are only attainable if the liberalization follows a gradual process. Others have dismissed any attributable gain from capital account liberalization on the premise that an unregulated capital flow would facilitate the occurrence and spread of currency crisis (Edison *et al.,* 2004; Fernández *et al.,* 2016). Along this line, Henry (2007) noted that the conventional view about capital account liberalization is nothing short of a fanciful attempt to extend the results on the gains to international trade in goods to international trade in assets. As argued further by the author, the view about gains of capital account liberalization would only hold in a world that is free from all market frictions except that which is imposed by barriers to free capital flows, but this is inconsistent with economic realities. Reflective of these conflicting arguments, earlier empirical studies devoted to shedding light on the relationship are no less ambiguous. For instance, while Quinn (1997) found a

statistically significant positive association between capital account liberalization and economic growth, Rodrik (1998) and Kraay (1998) do not find any evidence of such.

In light of this weak evidence, several studies have explored how a country's idiosyncrasies can shape the effects of capital account liberalization. For instance, studies have examined how a country's financial market (Kose *et al.,* 2011), institutional quality (Bekaert et al., 2005; Chinn & Ito, 2006; Kose *et al.,* 2011), overall development level (Klein & Olivei, 2008; Prasad *et al.,* 2007) and macroeconomic policies (Arteta *et al.,* 2003) can influence the growth effect of capital account liberalization. Studies have also examined the direct effect of capital account liberalization on different components of economic growth such as financial development (Klein & Olivei, 2008), productivity (Bonfiglioli, 2008), domestic investment (Mody & Murshid, 2005), exchange rate (Edwards & Rigobon, 2009), stock market variability (Edwards, 1999), foreign exchange liquidity (Cantú, 2019), and international trade (Tamirisa, 1999; Wei & Zhang, 2007; Fu & Cao, 2020).

On the international trade effects of capital control, copious channels could be divulged about the nexus. For instance, capital control can cause a significant disparity between the official exchange rate and the market rate thereby imposing an additional trade cost which would dampen trade. However, it could also be that capital controls are used to maintain a stable exchange rate, which will ultimately spur export growth due to a reduction in exchange rate variability. Also, excessive foreign capital inflow can cause appreciations of the real exchange rate, and therefore a loss of external competitiveness. In this case, capital controls could be considered a second-best policy option to hedge against such risks.

Furthermore, capital controls can affect trade by increasing transaction costs. Capital controls stifle the development of liquid and efficient foreign exchange markets and modern payment instruments, which would increase the cost and uncertainty associated with international transactions (Tamirisa, 1999, p.71). Akin to this, Wei & Zhang (2007) argued that one of the responses of firms to capital controls is to miss-invoice imports and exports to circumvent capital account restrictions. In response to this, custom officers would increase inspection at the border in a bid to guard against firms that may try to evade the capital restriction and thereby dampening trade. Capital controls can also reduce trade by limiting knowledge and technology transfers through foreign direct investment. Multinational enterprises typically prefer to move across the border to optimize their operations and then repatriate profits. As stressed by Markussen (1995), when a firm invests in a foreign country, it often brings with it its proprietary technology to compete successfully with indigenous firms. Domestic firms benefit from these through supply chain linkages, labor turnover, and market restructuring. These gains impact on the productive capacity and the quality of exported goods of local firms. In the event of capital controls, firms tend to lose out from these gains as capital controls deter foreign direct investments. Also, the inability to convert local currency to foreign currency can be a barrier for firms that source essential intermediate inputs abroad.

Finally, but not least, it could also well be that capital controls affect trade by affecting the supply and cost of capital. Chinn & Ito (2006) argued that unfettered cross-border capital flows allow the interest rate to rise to its competitive market equilibrium and enable domestic and foreign investors to engage in more portfolio diversification, which ultimately reduces the cost of capital and increase the availability of capital for borrowers. It also increases the efficiency level of the financial system by weeding out inefficient financial institutions. Arguing along this line, Tamirisa

(1999 p.71) notes that in the presence of capital controls, financial intermediation margin is often high, and local financial institutions enjoy substantial market power, while the range of available financial products and services tends to be narrow. Hence, financing trade is either unavailable or costly, and trade is more likely to fall.

While we argue that capital control can affect trade through different ways, to tract our empirical analysis, we solely focus on the effect of capital control on trade via the cost of capital channel. To attain this feat, we build on the theoretical argument and empirical strategy adopted in the literature on credit constraint and international trade (e.g., see Amiti & Weinstein, 2011; Manova, 2013). This literature argues that while all exporters face huge exporting costs which make them more reliant on external finance, differences in firm-specific credit constraints lead to heterogeneous export responses at the sector level to macroeconomic changes. Manova (2013), for instance, provides theoretical and empirical evidence suggesting that financially developed economies export relatively more in sectors that require more outside capital. Underpinning her work as well as those of others in the literature is the assumption that well-developed financial intermediaries and markets reduce moral hazard and adverse selection problems which tend to increase the firm's cost of external capital. Similarly, we argue that because unfettered international capital flow reduces the cost of capital and increase its availability for the borrowers, the export performances of sectors that require more outside capital would be relatively better-off and vice-versa.

3. Research Methodology

3.1. Empirical Strategy

To test the hypothesis that fettered international capital flows adversely affects the relative export performances of industries with greater reliance on external finance, results based on estimating variations of the following equation will be presented:

$$\Phi_{sijt} = \tau_{it} + \tau_{jt} + \tau_s + \psi_0 \boldsymbol{K}_{it} + otherControls + \upsilon_{sijt} \quad (1)$$

where Φ_{sijt} is the export flow in industry *s* from country *i* to *j* in period *t*. τ_{it} and τ_{jt} are time-varying importer and exporter fixed effects to proxy "multilateral resistance term" and other unobserved time-varying country heterogeneities. τ_s is industry fixed effects. $\boldsymbol{K}_{it}$ measures the extent of capital control in a country, while κ_s is a measure of an industry's external finance dependence. κ_s is country and time-invariant. Hence, we exclude its individual effect from equation (1) as it is already subsumed in the industry fixed effects.[1] The individual effect of $\boldsymbol{K}_{it}$ is also excluded from equation (1) since it will be absorbed by the time-varying exporter fixed effects. However, in the baseline result, we shall report results where we use time-invariant exporter and importer fixed effects. $otherControls$ is a vector of bilateral trade cost variables such as bilateral distances (ln $DIST$), common border ($Border$), and Common language ($COMLAN$), and Bilateral trade agreements (FTA).[2] Finally, υ_{sijt} is the idiosyncratic error term. We estimate equation (1) using OLS. However, in the robustness section, we shall consider two additional model

[1] In an unreported result, we perform two additional analyses. First, we remove the industry fixed effects and directly control the industry's external finance dependence. Second, we interact with the indicator of an industry external finance dependence with time dummies and see if the effect changes over time. In both cases, the results are similar to those obtained when we estimate the baseline equation (1).

[2] Because we include time-varying exporter and importer fixed effects, they absorb conventional time-varying exporter and importer controls like GDP pc, GDP and population.

specification and estimation strategies. Firstly, we shall implement the Helpman *et al.* (2008) two-stage estimation procedure, which corrects for selection bias that may arise due to the omission of zero trade flows. Secondly, we shall implement the Santos & Tenreyro (2006) Poisson-Pseudo Maximum likelihood (PPML) which corrects for both zero trade flows, and bias and inefficiency that may result from estimating a log-linear model in the presence of heteroscedasticity which is common in trade data.

Because we are interested in how capital control affects exports by increasing the cost of external capital, equation (1) explains bilateral industry export activity by interacting an industry characteristic (κ_s) with a country characteristic (K_{it}). Therefore, ψ_0 is the coefficient of interest, and we expect it to be negative and statistically significant at all times, suggesting that countries with fettered international capital flows have, on average, relatively worse export performance in industries with greater reliance on external finance. This empirical strategy builds on Rajan & Zingales (1998); they authors interacted a country-level indicator of financial development with an industry-level indicator of external finance dependence to identify the causal connection between financial development and output-growth. Utilizing this approach offers two gains. First, it minimizes concern over endogeneity. Specifically, it reduces concern over reverse causality because, while it is clear that capital control at the country-level would affect industrial activities, there is little or no reason to believe that export activities of specific industries should affect the extent of capital control at the country-level. It also reduces concerns over omitted variable bias because the specification allows the inclusion of different types of fixed effects. Secondly, it focuses on a specific channel, in our case the cost of external capital, through which the examined variables are related.

3.2. Data

Our primary empirical measure of capital control is the aggregate *de jure* capital control measure developed by Fernández *et al.* (2016). The index measures the intensity of a country's restrictions on the cross-border capital inflow and outflow for 100 countries over the period 1995 to 2015. Each component of the index is based on ten different asset categories: money market instruments (with a maturity of 1 year or less), bonds (with maturity higher than one year), equities, collective investments, derivatives, real estate, financial credits, commercial credits, guarantees and sureties, and direct investment. Each of the subcomponents is a binary variable that is set equal to one when there is a restriction and zero otherwise. The aggregate capital control intensity is then the average of the two resulting indicators on capital inflow and outflow. A higher value indicates a higher intensity level on capital control. In our sample, the values range from a low value of 0 to a high value of 1. The mean value is 0.34 with a standard deviation of 0.34. Countries at the 75th percentile have a score value of 0.68 while those at the 25th percentile have a score value of 0.05. Although we are interested in the aggregate capital control indicator, in the extended analysis, we shall also explore the differential trade effects of the two subcomponents of the aggregate capital control indicator i.e. inward and outward capital control.

As a robustness check, we shall employ two additional indicators on capital control. Firstly, we use the updated data of Chinn & Ito (2002) indicator on capital account openness. The index is based on principal component analysis of five proxies for government restrictions on capital mobility, including the openness of the capital account, the openness of the current account, requirements for the repatriation and surrender of export proceeds, and the existence of multiple exchange rates. Each of the subcomponents is a binary variable that is set equal to one when restrictions are non-existent and zero otherwise. Hence, higher values indicate capital liberalization. We reverse the

index by multiplying it by -1 so that higher values would signify higher controls on capital. As an attempt to capture the *de facto* capital control, we utilize the Lane & Milesi-Ferretti's (2007) measure of external capital stock as a share of GDP (following Kose *et al.* (2011) and Eichengreen *et al.* (2011)).[3] Because higher values of the variable indicate higher capital account liberalization, we also multiply it by -1 so that higher values can be interpreted as more restrictions on capital control.

The data on exports come from the BACI-CEPII database at the 6-digit Harmonized System Classification (HSC) for which there are corresponding explanatory variables over the sample period. We then use a concordance table to map the 6-digit HSC products into the 3-digit category in the ISIC Revision 2 Industry Classification.[4] Because we are interested in how capital control affects exports and the channels through which these effects come about, we derive six outcomes variables from the resulting trade data: (i) total export (T_{sij}) in industry *s* country *i* exports to country *j;* (ii) number of 6-digit HSC products (N_{sij}) in industry *s* country *i* exports to country *j*; (iii) number of markets destinations (M_{si}) in industry *s* country *i* export to; (iv) average export per product ($\bar{x}_{sij}$) in industry *s* country *i* exports to country *j*; and (v) export intensity (e_{sij}) in industry *s* country *i* exports to country *j*. Following recent developments in the literature (Manova, 2013; Manova, 2015; Ndubuisi & Foster, 2019; Dutt *et al.*, 2013; etc.), we define (ii)-(iii) as the extensive export margin, while (iv)-(v) are defined as the intensive export margin.

[3] As argued by Kose *et al.* (2011), the variable is a summary measure of a country's total exposure to international markets. Hence, it captures the extent of a country's financial integration which should be increasing the lower the capital control in the country.
[4] https://wits.worldbank.org/product_concordance.html

T_{sij} is calculated as the sum of HSC product value in industry s from country i to j. N_{sij} and M_{si} are calculated as a simple count of the number of products and market destinations in industry s, respectively. The average export per product ($\bar{x}_{sij}$) and export intensities (e_{sij}) in industry s by country i to j are calculated using the following equations:

$$\bar{x}_{sij} = {}^{T_{sij}}\Big/_{N_{sij}} \qquad \dots (2)$$

$$e_{sij} = \frac{V_{sijt}}{V_{it}} \Big/ \frac{V_{swjt}}{V_{wt}} \qquad \dots (3)$$

where V_{sijt} is the volume of export in industry s by country i to j in period t, V_{it} is the total export volume of country i to the world. V_{swjt} is the volume of export in industry s by a reference country (all country in the sample) to country j in period t, while V_{wt} is the total volume of export by the reference country. Other variables are as defined above. Table A1 in the appendix shows the distribution of the outcome variables in our sample.

For the industry measure of external finance dependence, we use the external finance dependence index that was initially computed by Rajan & Zingale (1998). It is computed as the average share of capital expenditures not financed with cash flows from operations. The computation is done using the Compustat annual industrial data on all publicly-listed firms in the US. While using the US as a benchmark to compute the index is due to the lack of comparable cross-country cross-industry data, our empirical framework treats the external finance dependence as a technological component of the industry. That is, it is for technological reasons that, say, the textile industry

depends more on external finance to fund its activities than the food products and beverages industry. In this situation, what matters is only the ranking of industries along these technological characteristics and as the financial market of US is well-developed, using the US as the benchmark ensures that the realized indicators are more reflective of firms' optimal choice over external financing in each sector (Rajan & Zingales, 1998; Manova, 2013, Crino & Ogliari, 2017). An added advantage of this approach is that it ensures the industry characteristic is not endogenous to the macroeconomic dynamics of a country, such as changes in the extent of capital control in the country.

To isolate the differential effect of capital control on exports in external finance dependent industries, in the robustness section, we shall control for different industry characteristics such as skill, capital, natural resource, institutional and R&D intensities, and asset intangibility, liquidity need, and industrial goods durability. These variables are taken from Kroszner *et al.* (2007), Nunn (2007) and Manova (2013). Table A2 in the appendix describes how they are measured. To ensure that the indicator of capital control is not picking the effects of other country characteristics, in the robustness section, we shall also control for the differential export effects of other country characteristics in external finance dependent industries. The country characteristics include human capital, physical capital, natural resource, institutional quality, domestic credit market, consumer price index, trade openness, and per capita GDP. Table A3 in the appendix describes these variables and their sources.

Finally, all gravity model variables are also taken from the BACI-CEPII database. Except for Distance, which is measured in kilometers per distance, the other bilateral trade costs variables are

dummies that take the value of one if the country-pairs are common in those dimensions and zero otherwise.

4. Empirical Results

This section proceeds in four sub-sections. The first section presents the baseline results. The second section presents the robustness checks on the former. The third section presents the results on the export margins, while the last section presents the results on the export effects of capital control when we differentiate between inward and outward capital control, and the results on the export effects of capital control in OECD and non-OECD countries.

<Insert table 1 here>

4.1. Baseline Results

Table 1 displays the baseline results about the effect of capital control on exports using the Fernández *et al.* (2016) aggregate measure of capital control. The dependent variable for each reported regression in the table is (log) disaggregated total bilateral industry exports while the standard errors are all clustered at the country-pair level. Before exploring the differential effect of capital control on exports, we first conduct a preliminary analysis by estimating the average effect of capital control on exports in columns (1)-(3). Specifically, we regress log bilateral industry exports on our measure of capital control without controlling for the interaction term between capital control and external finance dependence. Column (1) shows the result when we only include the control variables in the benchmark equation (1). The result suggests that capital control has a significant adverse effect on exports. However, when we include additional control variables in column (2) to minimize omitted variable bias, the estimated coefficient of capital control turns

statistically insignificant, albeit it is still negative. In column (3), we replace the exporter and importer fixed effects with country-pair fixed effects to control for unobserved country-pair heterogeneities. The estimated coefficient of capital control turns back to being statistically significant at 1 percent. Overall, results in columns (1)-(3) are somewhat consistent with those obtained by Tamirisa (1999) and Wei & Zhang (2007) in suggesting that capital controls hurt trade

Next, we turn to our primary empirical investigation and focus on the interaction between capital control and external finance dependence which are reported in columns (4)-(8). Columns (4)-(6) re-estimate the regressions of columns (1)-(3) while including the interaction variable between capital control and external finance dependence. In the three columns, the estimated coefficient of the interaction variable is consistently negative and statistically significant at all conventional levels. This is suggestive evidence of a strong sectoral heterogeneous effect of capital control that is driven by an industry's relative dependence on external finance in meeting up the enormous costs associated with exporting. Column (7) shows results when we estimate our benchmark equation (1) which uses industry and time-varying exporter and importer fixed effects. The estimated coefficient of the interaction variable is consistent with its previous estimates in columns (4)-(6). In column (8), we further replace the industry fixed effects with time-varying industry fixed effects to control for potential influences of time-varying industry factors on trade. Again, we find that our initial result remains unchanged.

Overall, the results presented in columns (4)-(8) of Table 1 support our hypothesis that capital control adversely affects export performances of sectors that tend to depend more on external finance, which we argue is because of the higher cost of external capital associated with fettered international capital flows. The result is also economically meaningful. For instance, based on the

estimated coefficient of $k_s \boldsymbol{K}_{it}$ in column (7), the result suggests that a one standard deviation expansion in the capital control measure will reduce total exports by 12.2 percentage points for an industry at the average external finance dependence. Furthermore, the estimated coefficient of $k_s \boldsymbol{K}_{it}$ in column (7) indicates that total exports for an industry with an average external finance dependence (0.28) reduce by 23.2% in a country with capital control at the 75th percentile (0.68) compared to a country with capital control at the 25th percentile (0.05).

Finally, regarding the control variables, across each specified model in the Table, we obtain estimated coefficients with their *a-priori* expected signs where statistically significant.

4.2. Baseline Result: Additional Robustness Checks

In this section, we subject the baseline result on the differential export effects of capital control to several robustness checks including; (i) controlling for other industry and country characteristics that may confound the effect of capital control on exports; (ii) controlling for alternative industry financial vulnerability; (iii) using alternative measures of capital control; and (iv) controlling for zero trade observation. In all cases, we find that our initial result that capital control adversely affects export performances of sectors that depend more on external finance is preserved.

4.2.1. Confounding Factors

While our main results indicate that capital control adversely affects exports in industries with high dependence on external finance, this result would be biased if our variable of interest ($k_s \boldsymbol{K}_{it}$) is correlated with the error term. This can occur if the extent of capital control is correlated with other country characteristics, which could be a source of comparative (dis-)advantage in industries that

depend more on external finance. The estimated coefficient of $k_s \boldsymbol{K}_{it}$ would also be biased if the industry external finance dependence is correlated with other industry characteristics which have been found to also affect the composition of trade in the broader trade literature. There can also be some mixture of these two effects, for example, that high capital control is correlated with poor institutional quality, and that a large number of institutionally-dependent industry exports is correlated with having high external financing needs. To address these concerns, we perform two additional analyses. Firstly, we control for other country characteristics interacted with their respective industry characteristics. We report the results for this exercise in Table 2. Secondly, we rerun our basic equation (1) with full sets of interaction terms between industry external finance dependence and country characteristics. We report the results for this exercise in Table 3.

<Insert table 2 here>

In Table 2 where we include interaction term variables between different country characteristics and their respective industry characteristics, we observe that the estimated coefficient of $k_s \boldsymbol{K}_{it}$ remains consistently negative and statistically significant at all conventional levels. Importantly, introducing these interaction term variables individually in columns (1)-(4) and jointly in column (5) only marginally affect the sizes of the estimated coefficient of $k_s \boldsymbol{K}_{it}$, but the main evidence of a differential effect of capital control on exports is preserved. These results lead to the further conclusion that the observed differential export effects of capital control due to differences in industries' reliance on external finance are independent of these other sources of comparative advantages. In column (5), we further control for the level of a country's domestic credit market and find that our initial result is still preserved even after jointly accounting for other interaction terms between different industry characteristics and their respective country characteristics in

column (6). One of the ways that have been emphasized in the literature through which capital control affects industrial activities in the economy is through its effect on the domestic credit market (Chinn & Ito, 2006; Kose *et al.,* 2011; Eichengreen *et al.,* 2011). Hence, the observed significant effect of capital control in columns (5) and (6), even after controlling for the influence of the domestic credit market, suggests that capital control exerts on influence on exports over and above its effect on the domestic credit market.

The newly added interaction variables also yield results that are consistent with the existing literature. For instance, in column (7), the estimated coefficients of the interaction variables between physical and human capital and their respective factor intensities are consistent with those obtained by Nunn (2007) and Levchenko (2007). They suggest that skill-intensive countries export more in skill-intensive industries, while capital-intensive countries export more in capital-intensive industries. The estimated coefficient of the interaction term between institutional quality and contract intensity is consistent with Nunn (2007), and it suggests that countries with better contracting institutions export more in contract-intensive industries. The estimated coefficient of the interaction term between financial development and external finance dependence is consistent with Manova (2013) and it suggests that financially developed economies export more in financially vulnerable industries. Lastly, the result of natural resources suggests that resource-rich countries have a comparative advantage in resource-intensive industries (see Levchenko, 2007).

<Insert table 3 here>

Next, columns (1)-(6) of Table 3 report the results when we rerun the basic specification with full sets of interaction term variables between external finance dependence and different country

characteristics to ensure that the observed differential effect of capital control on export is not picking the effect of other country characteristics that may be a source of comparative (dis-)advantage in external finance dependent industries. In column (7), we further interact (log) exporter per capita GDP with industry external finance dependence to isolate any effect due to the overall development of the country that capital controls may be picking. In all cases, we find that our initial result remains unchanged even when we jointly include these interaction variables in column (8). These results, therefore, suggest that fettered international capital flows exert an independent influence in external finance dependent industries, an effect we argue is by increasing the cost of external capital.

4.2.2. Alternative Financial Vulnerability

Our identification strategy on the causal connection between capital control and patterns of exports has relied on the cost of external capital, which we argue is higher in a country with a fettered international capital flows. But that due to inter-industry differences on the relative dependence on the financial market to assuage their financial needs, the effect of capital control on industrial activities in a country would vary across industries. Is this true or just an artifact of the data? We probe more into this in Table 4 by controlling for other industry characteristics that may be related to the ease of obtaining external finance which has been employed in the literature.

<Insert table 4 here>

One of the potential sources of an industry financial vulnerability is its R&D intensity. R&D is a cost-intensive activity, and it often requires external financing because R&D investing firms quickly exhaust their internal funds. However, R&D intensive firms face higher external finance

constraints for at least two reasons. First, a significant fraction of R&D expenditures go into the salaries and wages of scientists and researchers, which cannot be adequately collateralized by financial intermediaries. Second, firms may be unwilling to divulge all information concerning their R&D activities to potential lenders as doing otherwise increases the risk that ideas developed through R&D activities may be appropriated and replicated by competitors (Agénor *et al.,* 2014). If external finance dependence is correlated with the industry R&D intensity, and the country's relative export performances are explained by its R&D intensity, it could be that $k_s \boldsymbol{K}_{it}$ is picking up variations in the R&D intensity of the goods produced by the industry rather than its dependence on external finance. To check for this, in column (1), we include an interaction comprising capital control and industry R&D intensity. Despite the high correlation between the indicator of external finance dependence and R&D intensity in the sample, which is about 64 percent, we find that our initial result is preserved.

While credit arrangement is backed by collateral because lenders must recover their losses by exploiting the value of the hypothecated asset in the event of default, intangible assets are conventionally considered poor collaterals due to their intangibility and concerns about outside valuation, and redeployment (Alimov, 2019). Other things equal, it follows that firms with relatively large intangible assets in their balance sheets would face limited credit access and ultimately, export less compared to firms with more tangible assets, which can easily be hypothecated. While this makes an industry to be more financially vulnerable than others, the driving force is more of asymmetric information than the cost of external capital. Notwithstanding, it is still possible that capital control exerts an influence on industrial activities through this channel since it can stifle the efficiency level of the financial system and deter financial reforms that lead to better financial infrastructure to value intangible assets. To isolate this channel from the one we

focus on, we interact the industry asset intangibility and capital control in column (2). While we find that industries that tend to have a higher proportion of intangible assets are adversely affected in a country with fettered international capital flows, the interaction variable between external finance dependence and capital control is virtually unchanged from the estimates in column (7) of Table 1.

In column (3), we further interact capital control with the ratio of inventories to sales to proxy firms' dependence on external financing for short-term working capital. While this may be a source of industry financial vulnerability, firms may overcome this by building superior inventory management practices for reasons unconnected to finance (Manova, 2015). Hence, the differential effect of capital control on these sectors is ambiguous. Notwithstanding, controlling for this variable leaves our main result unchanged. Kroszner *et al.* (2007) have argued that industries that manufacture durable goods tend to be highly dependent on external finance. Hence it could be that our interaction term is picking up variations in the durability of goods produced by industry rather than its dependence on external finance. To isolate this effect, we interact capital control and industry indicator of manufactured goods durability in column (4) and find that our initial result on the variable of interest remains unchanged. Finally, we jointly include these new interaction variables in column (5), and we find that our results are preserved. Overall, results presented in Table 4 support our hypothesis of a differential export effect of capital control that works via increasing the cost of external capital.

<Insert table 5 here>

4.2.3. Alternative Measures of Capital Control

In this section, we test the robustness of our results by employing alternative capital control measures. Specifically, we use the Chinn & Ito (2002) capital account openness index, and Lane & Milesi-Ferretti's (2007) measure of external capital stock as a share of GDP. As noted in section 3.2, because higher values of these variables indicate higher capital account liberalization, we reverse them by multiplying them by -1 so that higher values would signify higher control on capital. Table 5 reports the results when we use these alternative indicators. In all columns in the table, the results are consistent with those obtained while using the Fernández *et al.* (2016) capital control measure. In comparison, however, the estimated coefficient of $k_s \boldsymbol{K}_{it}$ when we use the Chinn & Ito (2002) index ranks highest, while those obtained using the *de facto* measure rank lowest. Overall, the results presented in Table 5 support our hypothesis. They also suggest that the observed adverse effect of capital control on exports in industries with higher dependence on external finance is not explained by the capital control measure we utilize.

4.2.4. Dealing with Zero Trade

Zero bilateral trade flows are commonly observed in bilateral trade data. In our case, it accounts for approximately 45 percent of the dyad trade links. Acknowledging the pervasiveness of zero trade observations, Helpman et al. (2008) argue that zero trade flows are not random because they are conditioned upon various factors such as distance and trade costs. Hence, our baseline result, which considers only positive trade flows may be spurious due to sample selection issues. To address this problem, Helpman *et al.* proposed a two-stage estimation procedure to account for the biases associated with selection and the omission of the extensive margin due to ignoring zero trade flows. However, Santos & Tenreyro (2006) argue that heteroscedasticity is pervasive in trade data and a log-linear specification that uses OLS or other estimators that require non-linear

transformations are unable to address the bias and inefficiency that may result thereof properly. Hence, they proposed the Poisson-Pseudo Maximum likelihood (PPML) estimator which can be applied to unlogged trade data. Because the trade data are in levels, the method also allows accounting for zero trade flows. We implement these two methods and report the results in Table 6.

<Insert table 6 here>

The first-stage equation of the Helpman *et al.* two-stage estimation procedure is a Probit selection equation with the dependent variable taking a value of one for positive exporter-industry-importer pairs and zero otherwise, while the second-stage is a trade flow equation. The dependent variable in the latter is the log bilateral industry export value by destination. The implementation of the procedure requires the use of an empirical proxy for the fixed costs of international trade, which affects firm export status but not the level of their exports. Following Helpman *et al.* (2008) and Manova (2013), we consider two sets of excluded instruments associated with regulation costs of firm entry: number of days to register a business (cost1) and the relative cost to GDP per capita for an entrepreneur to start operating a business (cost2).[5] Using these variables as exclusion instruments are informed by the fact that countries with regulatory barriers to starting a domestic business are more likely to face barriers to export.

As a result, in column (1) of Table 6 confirms, higher regulatory costs of doing business reduce the probability of export market participation. Interestingly, the estimated coefficient of $k_s \boldsymbol{K}_{it}$ is negative and statistically significant at all conventional levels. This suggests that capital control

[5] Data on these variables are taking from the World Bank Development Indicators.

lowers the probability of entering new markets, and this effect is higher in industries with greater external finance dependence. This provides the first empirical evidence of a potential differential effect of capital control on the extensive export margin. The second-stage result is illustrated in column (2). We find that our main result still holds even after correcting for biases due to selection and the omission of the extensive margin. The estimated coefficient of $k_s \boldsymbol{K}_{it}$ is still significant with the expected sign and is quantitatively close to those obtained from the benchmark regression. Finally, column (3) reports the result for the PPML. We find that the estimated coefficient of $k_s \boldsymbol{K}_{it}$ is still significant with the expected sign. Overall, results reported in Table 6 lend credence to the hypothesis that fettered international capital flows adversely affect export performance in industries with greater reliance on external finance.

4.3. Export Margins

Results in the previous sections suggest that capital control adversely affects the patterns of a trade by increasing the cost of external capital. In this section, we probe further on the potential mechanisms underlining this nexus by analyzing the effects of capital control on the extensive and intensive export margins. As indicated in section 3.2, the extensive margin is defined here as the number of 6-digit HSC product in industry *s* country *i* exports to country *j,* and the number of market destinations in industry *s* country *i* export to. These two margins capture the idea of product and market diversification. On the other hand, the intensive margin is defined here as the average exports per product and the intensity of exports in industry *s* country *i* exports to country *j*. We argue that fettered international capital flows, by raising the cost of external capital, would negatively affect aggregate exports by reducing the extensive and intensive export margins.

Drawing insights from the heterogeneous firm trade models (e.g., see Melitz, 2003, Bernard *et al.,* 2003, Chaney, 2008; Manova, 2013) where changes in fixed and variable trade costs affect export activities, capital control can affect the extensive and intensive margins by increasing the relative trade costs firms face. While exporting is well-associated with fixed and variable costs, which make exporters more reliant on external finance, capital control makes it difficult for firms to meet up with these costs. On the one hand, the increase in the cost of external capital induced by capital control increases the relative fixed and variable costs a firm from the country with stringent capital controls would face. Hence, firms from such a country will find it relatively more challenging to enter the export markets while already exporting firms will find it relatively more challenging to break into new markets or meet up its export demand, and these would drive down the extensive export margin.[6] It will also affect the range of goods exported, as new firm entry is often associated with new or differentiated products because they want to gain market niche.

Ideally, exporters would like to export to multiple markets as much as they would like to diversify their product scope. Among others, export market diversification reduces export earnings instability and insulates an exporter from market-specific shocks. However, multiple market entry, as opposed to single market entry, is associated with additional entry costs that exporters must account for. Because capital control increases the cost of external capital, exporters are unable to pay for these additional costs associated with multiple market entry, and thereby, reducing the number of market entry. On the other hand, because of the relative increase in variable trade costs induced by capital control, firms would be unable to ship more products per market destination. Alternatively, they may reduce their export intensities, as they face more constraints in overcoming

[6] Capital controls that restrain exchange rate convertibility would also intensify this effect.

the trade variable costs. The concomitant effects of these two would then drive down the intensive export margins. Moreover, the exit of firms because of limited capital access to intensify production could also contribute to exerting a negative effect on the intensive margins. Indeed, Eichengreen *et al.* (2011) have shown that capital control lowers industrial outputs.

<Insert table 7 here>

Against this backdrop, Table 7 reports the results on the effect of capital control on the extensive and intensive export margins. We report the results using the three capital control measures to show the robustness of our results. Columns (1)-(3) show the results for the number of products exported, while columns (4)-(6) show the results on the number of markets exported to in the industry. The number of observations in columns (4)-(6) falls markedly to about 56,000 because we collapse the importer dimension of the data. Consistent with our expectation, the estimated coefficient of $k_s \boldsymbol{K}_{it}$ in columns (1)-(6) are consistently negative and statistically significant at all conventional levels, suggesting that capital control disproportionately affects aggregate exports by reducing both the range of exported goods and the number of market entry. These results corroborate the first-stage result of the Helpman *et al.* (2008) two-stage estimation procedure reported in Table 6, which showed that capital control reduces the probability of market entry, particularly for credit-constrained industries. Finally, columns (7)-(12) report the results for the intensive margin with columns (7)-(9) showing results for the average export per product, while column (10)-(12) show results for the export intensity. Consistent with our conjecture, we find a negative and statistically significant effect of the variable of interest on both margins. In summary, results reported in Table 7 support our argument that capital controls, by raising the cost of external capital, would negatively affect aggregate exports by reducing the extensive and intensive export margins.

4.4. Further analysis

The analysis so far has focused on aggregate measures of capital controls. It has also focused only on the full sample. However, there are reasons to believe that capital control may exert a heterogeneous effect on trade, which may come from different restrictions on inward or outward capital control or the development level of a country. For instance, Fu & Cao (2020) found that inward capital control hurts exports, while outward capital controls have a positive impact on exports. Tamirra (1999), on the other hand, found evidence of an adverse effect of capital control on only exports of developing countries. In this section, we investigate these two potential sources of heterogeneity.

<Insert table 8 about here>

Table 8 reports results on the differential effect of outward and inward capital controls on total exports and export margins. For the total exports in column (1), we observe that both inward and outward capital controls adversely affect total export. However, the relative impact of inward capital control, as measured by the sizes of the estimated coefficients is higher. This is further corroborated by the fact that when we subject the estimated coefficients of the interaction variables between "inward capital control and external finance dependence", and "outward capital control and external finance dependence" to an F-test, the hypothesis that they are equal is rejected at the 1 percent significant level. The test also leads to the conclusion that both types of control exert an independent adverse effect on the patterns of exports. While this result is different from that of Fu & Cao (2020) which uses the same measure of capital control, their study focuses only on the average export effects of inward and outward capital controls. Our study, on the other hand, establishes causality by exploiting the variation in capital control across countries and the variation

in external finance dependence across sectors. The remaining columns in the Table show results for the different export margins. The results are largely consistent with those reported in Table 7 in suggesting that capital control, by raising the cost of external capital, would adversely affect total export by reducing the extensive and intensive export margins. Also, the results further suggest that this adverse effect of capital control on bilateral exports include both controls on inward and outward cross-border capital flows.[7]

<Insert table 9 about here>

Table 9 displays the results on the effect of capital control on the patterns of trade of countries at a different development level. We follow Klein & Olivei (2008) and analyze the effect of capital control in OECD and non-OECD countries. Columns (1)-(2) show results on total export for OECD and non-OECD countries. While the results suggest that capital control has an adverse trade effect in both groups when we compare the relative sizes of the estimated coefficients of $k_s\boldsymbol{K}_{it}$ in both groups, we observe that the effect is higher for non-OECD countries. This suggests that the adverse effect of capital control on exports in industries with higher reliance on external finance is higher for non-OECD countries compared to OECD countries.[8] One of the plausible explanations for this could be that non-OECD countries are capital-scarce economies wherein capital controls intensify the situation. Finally, the remaining columns in the Table show the results for the different export margins. The results are largely consistent with those reported in Table 7 in suggesting that capital

[7] Except for the results in column (3), when we subject the estimated coefficients of the interaction variables between "inward capital control and external finance dependence", and "outward capital control and external finance dependence" in columns (2)-(5) to an F-test, the hypothesis that they are equal is also rejected at the 1 percent significant level in all case.

[8] In an unreported result, we obtain the same result when we use the other two indicators.

control deters export via the extensive and intensive margins. An exception to this is columns (5)-(6) wherein we do not find any significant effect on the margin. Overall, the result in Table 9 indicates that capital control adversely affects export in OECD and non-OECD countries, but this effect could be worse for non-OECD countries.

5. Conclusion

Studies on the economic effects of restrictions on cross-border capital flows have paid little attention to its effect on international trade. Importantly, few existing studies that have evaluated the relationship between capital control and international trade only focused on the average effect of capital control on aggregate trade. In this study, we advanced the literature by analyzing how capital control affects the patterns of trade by raising the cost of external capital. We also contribute to the literature by evaluating how capital control affects the extensive and intensive export margins to provide context on the exact mechanism linking capital control and trade. To address our research objective that capital control affects trade via the *cost of external capital channel*, we examined the differential impact of capital control on the export activities across industries with inherently different reliance on external finance (following the methodology in Rajan & Zingales, 1998). Our identification assumption is then that because of a relatively greater dependence of some industries on external finance to fund their activities, including trade, the higher cost of external capital induced by capital control would apply more forcefully to these industries, given the inefficiency in the credit market.

Results from the analysis support our hypothesis that capital control adversely affects exports by increasing the cost of external capital. We also find that the export distorting effects of capital control is invariant of whether the restriction is on inward or outward cross-border capital flows,

although the relative impact of inward capital control is higher. When we examine the effect of capital control on export margins, we find that capital control affects aggregate exports by reducing the extensive and intensive export margins. Specifically, we find that restrictions on cross-border capital flows reduce the range of exported goods and deters both single and multiple market entry by exporters (i.e., the extensive margins) and reduces the average export per product and export intensities of exporters (i.e., the intensive margin), particularly in industries that are more reliant on external finance. Finally, we find that the export distorting effects of capital control is higher in non-OECD countries relative to OECD countries. From a policy perspective, our findings suggest that for countries that pursue export-led growth, policies on capital control are incompatible with this objective. At a more granular level, our findings also suggest that a country's industry composition can shape the effect of capital control in the local economy. Specifically, it suggests that countries that export more in external finance dependent industries are affected more adversely by restrictions on cross-border capital flows.

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Table 1: Capital Control and Exports: Baseline Result

	(log) Total Exports							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Capital Control	**-0.134**	**-0.035**	**-0.087**	0.316	0.412	0.361		
	[0.029]* **	**[0.027]**	**[0.026]*** **	[0.033]***	[0.031]***	[0.030]***		
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)				**-1.338**	**-1.329**	**-1.336**	**-1.325**	**-1.326**
				[0.046]* **	**[0.046]*** **	**[0.046]*** **	**[0.046]*** **	**[0.047]*** **
Log Bilateral Distance	-1.296	-1.289		-1.296	-1.289		-1.289	-1.290
	[0.020]***	[0.020]***		[0.020]***	[0.020]***		[0.020]***	[0.020]***
Border	0.606	0.613		0.603	0.610		0.607	0.607
	[0.080]***	[0.080]***		[0.079]***	[0.080]***		[0.080]***	[0.080]***
Language	0.573	0.576		0.573	0.575		0.577	0.577
	[0.037]***	[0.037]***		[0.037]***	[0.037]***		[0.037]***	[0.037]***
FTA	0.452	0.477	0.171	0.453	0.479	0.171	0.493	0.494
	[0.032]***	[0.032]***	[0.015]***	[0.032]***	[0.032]***	[0.015]***	[0.035]***	[0.035]***
Colony	0.735	0.738		0.734	0.737		0.739	0.739
	[0.077]***	[0.077]***		[0.076]***	[0.077]***		[0.077]***	[0.077]***
log Exporter GDP		0.271	0.218		0.276	0.222		
		[0.061]***	[0.061]***		[0.061]***	[0.061]***		
Log Importer GDP		0.501	0.529		0.499	0.526		
		[0.043]***	[0.042]***		[0.043]***	[0.042]***		
Log Exporter GDP pc		0.001	0.054		-0.003	0.050		
		[0.065]	[0.065]		[0.065]	[0.065]		
Log Importer GDP pc		0.138	0.134		0.141	0.138		
		[0.046]***	[0.046]***		[0.046]***	[0.046]***		
Log Exporter Population		0.005	0.005		0.005	0.005		
		[0.000]***	[0.000]***		[0.000]***	[0.000]***		
Log Importer Population		0.002	0.002		0.002	0.002		
		[0.000]***	[0.000]***		[0.000]***	[0.000]***		
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Exporter Effects	Yes	Yes	No	Yes	Yes	No	No	No
Importer Effects	Yes	Yes	No	Yes	Yes	No	No	No
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Country-Pair Effects	No	No	Yes	No	No	Yes	No	No
Exporter-Year Effects	No	No	No	No	No	No	Yes	Yes
Importer-Year Effects	No	No	No	No	No	No	Yes	Yes
Industry-Year Effects	No	No	No	No	No	No	No	Yes
R-Squared	0.60	0.60	0.65	0.60	0.60	0.65	0.61	0.61
# Observations	3,044,044	3,033,098	3,033,035	3,044,044	3,033,098	3,033,035	3,033,098	3,033,098

** p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets.*

Table 2: Capital Control and Export: Conventional Sources of Comparative Advantage

	(log) Total Exports						
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)	**-1.222**	**-1.325**	**-1.222**	**-0.922**	**-0.679**	**-0.738**	**-0.290**
	[0.046]* **	**[0.046]*** **	**[0.045]*** **	**[0.044]*** **	**[0.042]*** **	**[0.044]*** **	**[0.043]*** **
Human Capital × Skill Intensity	1.336				1.639		1.619
	[0.042]***				[0.040]***		[0.041]***
Physical Capital × Capital Intensity		-0.000			0.013		0.014
		[0.005]			[0.005]***		[0.005]***
Natural Resource × Resource Intensity			0.055		0.052		0.052
			[0.002]***		[0.002]***		[0.002]***
Institutional Quality × Contract Intensity				1.019	1.036		0.892
				[0.026]***	[0.025]***		[0.025]***
Financial Development × Finance Dependence						0.850	0.662
						[0.019]***	[0.018]***
Exporter-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.61	0.61	0.61	0.61	0.62	0.61	0.62
# Observations	2,963,858	3,033,098	3,033,098	3,033,098	2,963,858	2,793,257	2,731,510

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Table 3: Capital Control and Exports: Confounding Factors

	(log) Total Exports							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)	**-0.442**	**-1.402**	**-1.123**	**-0.145**	**-0.907**	**-1.245**	**-0.216**	**-0.137**
	[0.050]* **	**[0.041]*** **	**[0.045]*** **	**[0.047]*** **	**[0.048]*** **	**[0.046]*** **	**[0.049]*** **	**[0.046]*** **
Human Capital × Skill Intensity	1.346							1.641
	[0.042]***							[0.040]***
Human Capital × Finance Dependence	1.094							0.151
	[0.026]***							[0.038]***
Physical Capital × Capital Intensity		0.040						0.045
		[0.005]***						[0.005]***
Physical Capital × Finance Dependence		0.394						0.279
		[0.009]***						[0.009]***
Natural Resource × Resource Intensity			0.048					0.050
			[0.002]***					[0.002]***
Natural Resource × Finance Dependence			-0.028					-0.008
			[0.002]***					[0.002]***
Institutional Quality × Contract Intensity				0.776				0.810
				[0.025]***				[0.024]***
Institutional Quality × Finance Dependence				0.613				0.320
				[0.014]***				[0.028]***
Average Tariff × Finance Dependence					-0.052			-0.007
					[0.002]***			[0.002]***
Consumer Price Index × Finance Dependence						0.011		0.005
						[0.000]***		[0.000]***
Log GDP pc × Finance Dependence							0.493	-0.005
							[0.011]***	[0.023]
Exporter-Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.63
# Observations	2,963,858	3,033,098	3,033,098	3,033,098	2,972,363	2,918,066	3,033,098	2,853,877

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Table 4: Capital Control and Exports: Alternative Sources of Financial Vulnerability

	(log) Total Exports				
	[1]	[2]	[3]	[4]	[5]
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)	**-1.224**	**-1.186**	**-1.334**	**-1.298**	**-0.816**
	[0.044]* **	**[0.046]*** **	**[0.046]*** **	**[0.044]*** **	**[0.047]*** **
Capital Control × R&D Intensity	-2.547				-6.577
	[0.574]***				[0.559]***
Capital Control × Asset Intangibility		-3.028			-3.592
		[0.120]***			[0.125]***
Capital Control × Liquidity Ratio			2.289		3.935
			[0.345]***		[0.377]***
Capital Control × Durable Goods				-0.094	-0.335
				[0.024]***	[0.026]***
Exporter-Year Effect	Yes	Yes	Yes	Yes	Yes
Importer-Year Effect	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
R-Squared	0.61	0.61	0.61	0.61	0.61
# Observations	3,033,098	3,033,098	3,033,098	3,033,098	3,033,098

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Table 5: Capital Control and Exports: Alternative Measures of Capital Control

	(log) Total Exports	
	Chin & Ito (2002) Index	Lane & Milesi-Ferretti's (2007) Index
	[1]	[1]
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)	**-1.432**	**-0.044**
	[0.042]* **	**[0.003]*** **
Exporter-Year Effect	Yes	Yes
Importer-Year Effect	Yes	Yes
Industry	Yes	Yes
R-Squared	0.61	0.61
# Observations	3,015,640	3,033,098

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Table 6: Capital Control and Exports: Zero Trade Flows

	Helpman *et al.* (2008) 2-Stage Procedure		Santos & Tenreyro (2006)
	Pr(Total Exports > 0)	(log) Total Exports	Total Exports
	[1]	[2]	[3]
Capital Control	0.096		
	[0.019]***		
Capital Control × Finance Dependence ($k_s \boldsymbol{K}_{it}$)	**-0.224**	**-1.109**	**-0.305**
	[0.019]* **	**[0.042]*** **	**[0.181]***
Cost1	-0.141		
	[0.021]***		
Cost2	-0.412		
	[0.158]***		
Exporter Effect	Yes	No	No
Importer Effect	Yes	No	No
Exporter-Year Effect	No	Yes	Yes
Importer-Year Effect	No	Yes	Yes
Industry Effect	Yes	Yes	Yes
R-Squared	-	0.63	-
# Observations	5,458,752	3,033,098	5,458,752

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1. Also, column (1) contains unreported importer and exporter per capita GDP.

Table 7: Capital Control and Export Margins

	(log) # Products			(log) # Markets			(log) Export Per Product			(log) Export Intensity		
	Extensive Margins						Intensive Margins					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Capital Control × Finance	**-0.560**	**-0.605**	**-0.016**	**-7.810**	**-15.390**	**-0.525**	**-0.765**	**-0.827**	**-0.028**	**-1.335**	**-1.591**	**-0.047**
Dependence ($k_s \boldsymbol{K}_{it}$)	**[0.019]*** **	**[0.017]*** **	**[0.001]*** **	**[2.988]*** **	**[2.6502]*** **	**[0.128]*** **	**[0.031]*** **	**[0.029]*** **	**[0.002]*** **	**[0.055]*** **	**[0.051]*** **	**[0.003]*** **
Exporter-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year Effects	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.72	0.72	0.72	0.91	0.91	0.91	0.44	0.44	0.44	0.71	0.71	0.71
# Observation	3,033,098	3,015,640	3,033,098	55,852	54,963	55,852	3,033,098	3,015,640	3,033,098	3,012,217	2,995,495	3,012,217

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Except for columns (4)-(6), each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

***Note*:** Columns (1), (4), (7), and (10) are estimated with the Fernández et al. (2016) capital control measure which is our primary capital control measure. Columns (2), (5), (8) and (11) are estimated with the Chinn & Ito (2002) capital control indicator, while columns (3), (6), (9) and 12 are estimated with the Lane & Milesi-Ferretti (2006) indicator on gross external capital stock.

Table 8: Inward and Outward Capital Controls and Exports

	(log) Total Export	(log) # Products	(log) # Markets	(log) Export Per Product	(log) Export Intensities
		Extensive Margin		Intensive Margin	
	[1]	[2]	[3]	[4]	[5]
Inward Capital Control × Finance Dependence	**-0.913**	**-0.393**	**-8.438**	**-0.520**	**-1.051**
	[0.079]* **	**[0.032]*** **	**[4.634]***	**[0.055]*** **	**[0.098]*** **
Outward Capital Control × Finance Dependence	**-0.206**	**-0.106**	**-0.127**	**-0.099**	**-0.171**
	[0.065]* **	**[0.026]*** **	**[4.014]**	**[0.045]** **	**[0.080]** **
Industry Effects	Yes	Yes	Yes	Yes	Yes
Exporter-Year Effects	Yes	Yes	Yes	Yes	Yes
Importer-Year Effects	Yes	Yes	No	Yes	Yes
R2	0.61	0.72	0.91	0.44	0.71
N	3,032,283	3,032,283	55,800	3,032,283	3,011,449

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Except for column (3), each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Table 9 Capital Control and Exports: OECD and Non-OECD Countries

	(log) Total Export		(log) # Products		(log) # Markets		(log) Export Per Product		(log) Export Intensities	
			Extensive Margin				Intensive Margin			
	[OECD]	[non-OECD]	[OECD]	[non-OECD]			[OECD]	[non-OECD]	[OECD]	[non-OECD]
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Capital Control ×	**-1.173**	**-1.325**	**-0.379**	**-0.560**	**0.188**	**0.056**	**-0.795**	**-0.765**	**-0.942**	**-1.335**
Finance Dependence	**[0.076]*** **	**[0.046]*** **	**[0.029]*** **	**[0.019]*** **	**[0.121]**	**[0.070]**	**[0.056]*** **	**[0.031]*** **	**[0.089]*** **	**[0.055]*** **
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.70	0.61	0.79	0.72	0.82	0.85	0.54	0.44	0.79	0.71
# Observation	1,180,736	3,033,098	1,180,736	3,033,098	14,596	41,256	1,180,736	3,033,098	1,177,446	3,012,217

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered at the country-pair level in squared brackets. Except for (5)-(6), each column in the table contains unreported estimated coefficients on log bilateral distance, Border, Colony, Common Language, and FTA, as in column (7) of Table 1.

Appendix

Table A1: Description: Export Variable

Variable	#Observation	Mean	Standard Deviation	Minimum	Maximum
		Level			
Total Export	5,501,034	31467.14	478382.8	0	1.44e+08
Total Export > 0	3,044,044	56865.73	641966.9	1	1.44e+08
# Products	3,044,044	30.95521	58.71501	1	661
Export Per product	3,044,044	1262.469	19488.05	1	7513925
Export Intensity	3,044,044	4.43e-06	0.0006128	0	0.3758505
# Markets	55,852	82.78386	58.57295	0	216
		Log			
Total Export > 0	3,044,044	6.464311	3.260093	0	18.78615
# Products	3,044,044	2.228285	1.581986	0	6.493754
Export Per product	3,044,044	4.236026	2.14263	0	15.83227
Export Intensity	3,022,904	-21.93587	5.032954	-43.92455	-0.9795637
# Markets	55,852	4.030856	1.041138	0	5.375278

Table A2: Industry Characteristics

Contract intensity (z1) measures for each industry, the proportion of its intermediate inputs that are not traded on organized exchange while contract intensity (Taken from Nunn (2007)). External finance dependence (EFD) is the median of the share of capital expenditures not financed with cash flows from operations. (taken from Manova (2013)). Physical capital intensity (PCI) is defined as the share of real capital stock to total value added in 1980 (taken from Ciccone & Papaioannou, 2009). Liquidity needs (LN) is the ratio of inventories to sales. Durable goods (DG) is an indicator that takes a value of one of the sector manufactures predominantly durable goods, and a value of zero if the sector manufactures predominantly nondurable goods. Intangibility (AI) is the median level of the ratio of intangible assets to fixed assets. R&D intensity is the median level of the ratio of R&D expenses over sales for ISIC industries for the period. Data on LN, DG, IA, and R&D come from Kroszner *et al.* (2007), while data on NS come from Manova (2013).

ISIC	Industry Description	z1	LN	R&D	IA	EFD	PCI	HKI	NSI	DG
311	Food products	0.331	0.10	0.01	0.07	0.14	1.366	0.812	0	0
313	Beverages	0.713	0.10	0.00	0.14	0.08	1.744	1.135	0	0
314	Tobacco	0.317	0.28	0.00	0.34	-0.45	0.730	1.354	0	0
321	Textiles	0.376	0.17	0.01	0.01	0.19	1.807	0.688	0	0
322	Wearing apparel, except footwear	0.745	0.21	0.00	0.07	0.03	0.481	0.502	0	0
323	Leather products	0.571	0.23	0.01	0.09	-0.14	0.663	0.687	0	0
331	Wood products, except furniture	0.516	0.11	0.01	0.01	0.28	1.632	0.741	1	1
332	Furniture, except metal	0.568	0.15	0.01	0.09	0.24	0.789	0.698	0	1
341	Paper and products	0.348	0.13	0.01	0.11	0.17	2.215	1.139	1	0
342	Printing and publishing	0.713	0.07	0.01	0.43	0.20	0.785	0.934	0	0
352	Other chemicals	0.490	0.15	0.02	0.20	0.75	0.800	1.209	0	0
353	Petroleum refineries	0.058	0.07	0.00	0.00	0.04	2.593	1.656	1	0
354	Misc. petroleum and coal products	0.395	0.12	0.01	0.00	0.33	1.199	1.153	1	0
355	Rubber products	0.407	0.15	0.02	0.06	0.23	2.265	0.985	0	0
356	Plastic products	0.408	0.13	0.02	0.18	1.14	1.416	0.827	0	0
361	Pottery, china, earthenware	0.329	0.17	0.02	0.00	-0.15	2.316	0.804	0	1
362	Glass and products	0.557	0.15	0.02	0.06	0.53	1.954	1.012	0	1
369	Other non-metallic mineral products	0.377	0.15	0.01	0.03	0.06	1.746	0.952	1	1
371	Iron and steel	0.242	0.17	0.01	0.02	0.09	3.194	1.251	1	1

372	Non-ferrous metals	0.160	0.16	0.01	0.05	0.01	2.013	1.098	1	1
381	Fabricated metal products	0.435	0.17	0.01	0.09	0.24	1.173	0.914	0	1
382	Machinery, except electrical	0.764	0.20	0.02	0.13	0.60	1.017	1.119	0	1
383	Machinery, electric	0.740	0.18	0.07	0.03	0.95	0.924	1.064	0	1
384	Transport equipment	0.859	0.18	0.02	0.11	0.36	1.320	1.322	0	1
385	Professional and scientific equipment	0.785	0.21	0.09	0.15	0.96	0.654	1.234	0	1
390	Other manufactured products	0.547	0.20	0.02	0.15	0.47	0.878	0.755	0	1
3511	Industrial chemicals	0.246	0.14	0.03	0.06	0.25	2.385	1.408	0	0
P(25)		0.331	0.13	0.01	0.03	0.06	0.800	0.804	0.00	0.00
P(75)		0.713	0.18	0.02	0.14	0.47	2.014	1.209	1.00	1.00
Mean		0 .481	0.16	0.02	0.10	0.28	1.484	1.017	0.25	0.48

Table A3: Additional Control Variables

Variable Name	Definition	Source
Natural Resources	Total natural resources rents (% of GDP)	WDI
Per capita GDP	Per Capita GDP	WDI
GDP	GDP	WDI
Population	Total Population	WDI
Consumer Price Index	Consumer price index (2010 = 100)	WDI
Average Tariff	Tariff rate, applied, simple mean, all products (%)	WDI
Financial Development	Domestic credit to the private sector by banks (% of GDP)	WDI
Institutional Quality	Rule of Law	World Governance Indicator
Physical Capital	Capital Stock	Penn World Table 9.0
Human Capital	Human Capital Index	Penn World Table 9.0